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Spring 2006

WSTIAC

WEAPON SYSTEMS TECHNOLOGY INFORMATION ANALYSIS CENTER

Lean Six Sigma:

Its Application to Industrial, Transactional, and Science and Technology Processes

Contents

WSTIAC is a DoD Information Analysis Center Sponsored by the Defense Technical Information Center

by Rod Tozzi, U.S. Army Materiel Command.

This paper is an introduction to Lean Six Sigma (L6σ) and specifically to the application of L6σ by the U.S. Army Materiel Command. Having been involved in this effort in AMC since GEN Johnny Wilson first sent us "down range" to find out about Six Sigma in 1998, I believe I am qualified to track the progress (through success and failure) of the L6σ program as it has been applied to a Command decisively engaged in both industrial and transactional processes at a most critical time in our nation's history, specifically the Global War On Terrorism. In this paper, I will attempt first to describe L6σ in its purest form, define and justify the additions to the L6σ program made by AMC, and suggest a mechanism for involving Senior Management in a way that is most productive to advancing gains made through the application of L6σ.

L6σ has been around for a while but has only burst onto the Department of Defense in the past few years and most dramatically with the new Secretary of the Army, Francis Harvey. So, what are the current perceptions of L6σ? Well, some of the more common comments heard when L6σ is mentioned include: it's "the flavor of the month", it'll never work off a production floor, it's nothing but "Harry Potter magic," it's the Government following the latest guru in a robe and sandals, and the all time favorite - it doesn't apply to the R&D community. While it remains to be seen if the first count proves correct or not, the others are simply wrong.

But to make the case that these common perceptions are wrong, we must first define exactly what Lean Six Sigma is.

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by Mr. Gary J. Gray

Ladies and Gentlemen:

In his remarks at the National Defense Industrial Association meeting on September 21, 2005, Under Secretary of Defense for Acquisition, Technology and Logistics Kenneth J. Krieg, announced his intention to institutionalize Lean Six Sigma across the Department.

Lean Six Sigma is a methodology to eliminate waste in all operations and minimize non value-added variation across processes and services; in other words to transform business processes to a faster, more agile, less bureaucratic approach.

The most successful corporations in the world, including industry giants such as BAE Systems, General Dynamics, Northrop Grumman, Lockheed Martin and Raytheon have practiced lean six sigma for years and have reported significant efficiencies in cost and product quality.

The Defense Department has emulated successes found in business and the reported results are very impressive. For example:
- Aviation Intermediate Maintenance Department at Naval Air Station Lemoore has reduced the overhaul cycle time for the F404 jet engine from 85 days to 5 days.
- F-15 Wing Shop at Warner Robins Air Logistics Center has reduced their repair cycle time from 52 days to 35 days, and implemented a 37% reduction in manpower at the same time
- Letterkenny Army Depot reduced its Patriot Weapon System recapitalization costs by $11.9 million while freeing up 50,000 square feet of floor space.

We hope you find the lead article on Lean Six Sigma informative and useful. The author, Mr. Rod Tozzi, is the Lean Six Sigma Senior Master Black Belt at Headquarters, Army Materiel Command.

As always, I would appreciate any insights or comments you may have regarding these articles or topics you want addressed in our newsletter. I welcome guest authors that contribute to our mission. Please send any correspondence to gjgray@alionscience.com or call me at 703 933 3317.

Thanks,

Gary

The WSTIAC Newsletter is the current awareness publication of the Weapon Systems Technology Information Analysis Center (WSTIAC). WSTIAC, a Department of Defense (DoD) Information Analysis Center (IAC), is administratively managed by the Defense Technical Information Center (DTIC) under the DoD IAC Program.

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Lean Six Sigma *(Continued from page 1)*

For starters, it's a hybrid of Lean (also known as the Toyota Production System - TPS) and Six Sigma. Put simply, Lean is about speed and flow and the elimination of waste while Six Sigma is about precision and accuracy (in that order) leading to data driven decisions. So, the hybrid, L6σ, seeks to eliminate wasteful steps and variance from processes and does so in such a way as to utilize the speed of Lean while bringing the process on target with the accuracy of Six Sigma. This is not exactly an easy task as Lean speed has attracted most of its attention based on instant results, many of which have been unbaselined and, therefore, little more than anecdotal in nature. As any L6σ practitioner will note, a process for which the output has not been defined and the start point not baselined will produce results for which the goodness of any modifications to the process cannot be measured, i.e., we need to know that the results associated with the process modifications could not have simply occurred by chance. Similarly, Six Sigma results have often been overcome by events because the time to get to statistical process control was too lengthy. The marriage of Lean and Six Sigma then has to provide a methodology that permits the practitioner to baseline a process, make inferences about the process, modify the process accordingly, and then measure the "goodness" associated with the output. Because the practitioner is making inferences and not following the absolute rigor of Six Sigma in order to garner some speed in application, a key feature of L6σ is the acceptance of some margin of risk, specifically the probability that we may be committing an error by accepting that the output of our modified process did not occur by chance (referred to as a Type 1 error). How much risk are we willing to accept? That depends on what the process is. For example, we may want an exceptionally high probability that airplanes will continue to fly properly once they take off, i.e., we want a very low risk of failure, while we may accept higher risk that luggage will not make it on the airplane for which they were designated. There is cost associated with low risk and therein lies the tradeoff.

So now we have a working definition of L6σ. What does it bring to the table? Fundamentally, very little of L6σ is new; most components trace their lineage back to Shewhart, Deming, Taguchi, or Ohno (there are some exceptions) and some are a lot older tracing themselves back to Henry Ford or Eli Whitney (or even earlier). Having said that, there are two models that currently align themselves with L6σ and both of these have their own structured methods of thinking. They are the DMAIC model (Define-Measure-Analyze-Improve-Control) and the model specifically used in support of Design For Lean Six Sigma (DFLSS) called the DMEDI model (Define-Measure-Explore-Develop-Implement). The former finds its utility in improving processes and products while the latter is a bit more specific in its application to doing something brand new. Here it should be noted that the Research and Development community is decisively engaged in both, i.e., product improvements (pre-planned or otherwise) and new technologies and applications. Further, whereas L6σ itself is a classic "critical problem solving" application, the use of DMEDI intimates something beyond the realm of critical problem solving, i.e., something requiring creative problem solving tools and techniques. Just as with the tools and techniques associated with L6σ being of recent, albeit not necessarily new, origins, creative problem solving tools and techniques are also reasonably new (Alex Osborn being credited with the development of one of the first - and most commonly used - creative problem solving tools in the 1940-1950s, specifically "brainstorming"). The question may arise, why do we need creative problem solving? The answer is found in a fairly simple and yet detailed elucidation of the "levels of change" required to solve various degrees of problems. The *Seven Levels Of Change* by Rolf Smith characterizes the problem and can be summarized as depicted by Figure 1.

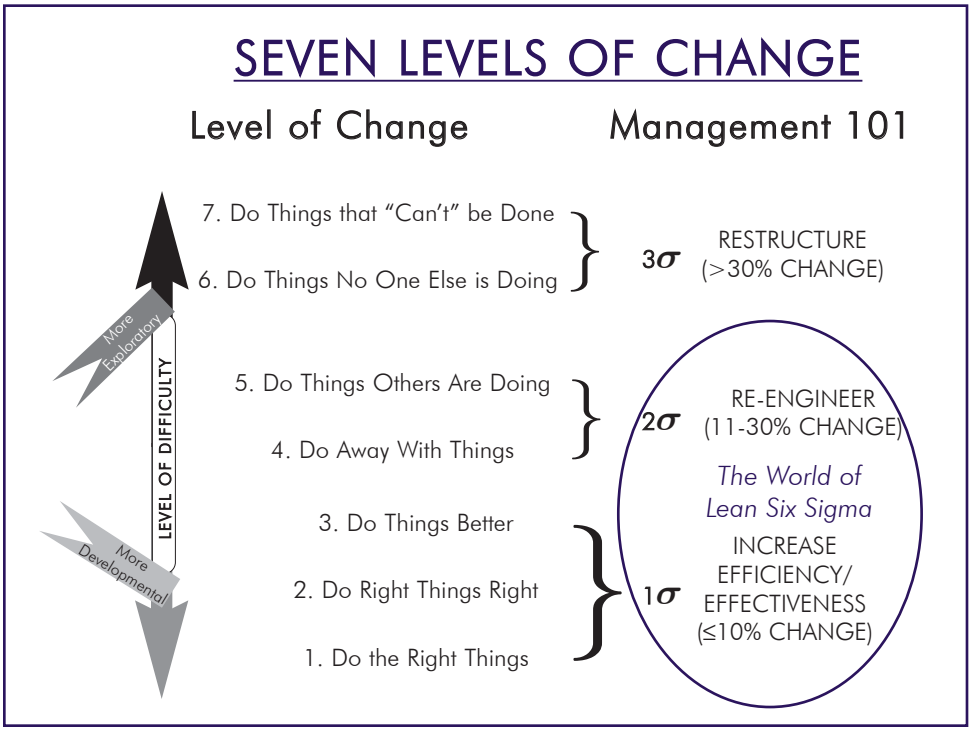


Figure 1.

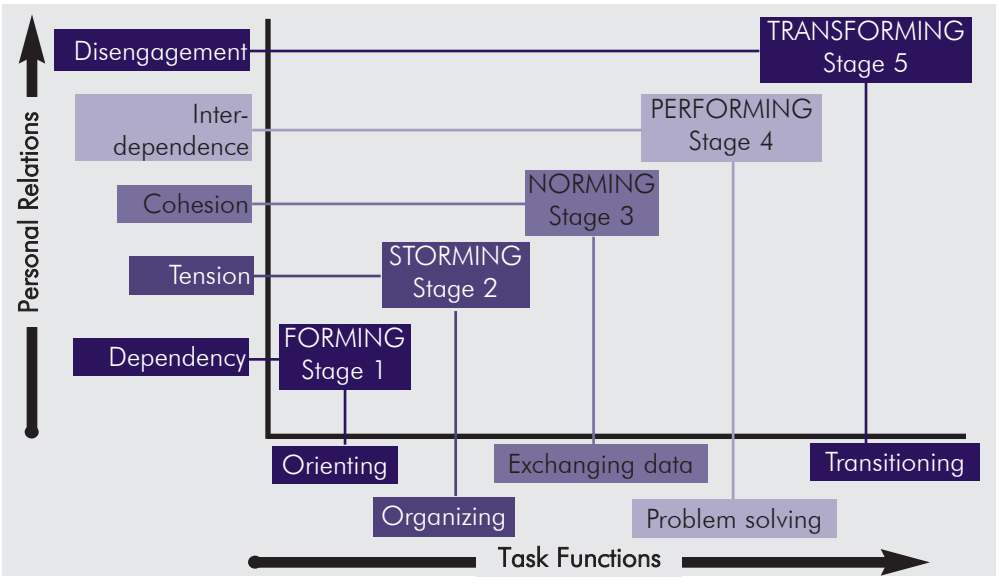
(Continued from page 3)

As can be seen, Levels 1-3 are fundamentally what is done in everyday business and can be quickly related to the somewhat trite expression of doing things better, faster, and cheaper. While these levels of change should not be ignored as they constitute the majority of the problems encountered on a given day, it's the remaining four levels that should attract the interest of real problem solvers. Levels 4-5 are the ones that are normally considered very difficult and requiring significant staff work. The reason is simple: level 4-5 changes are fundamentally issues of re-engineering which means someone is either going to lose his job or be told to do his job the way another entity is doing it. Either is traumatic. So far, the critical problem solving tools of L6σ work well. However, Level 6-7 problems are the ones that really require tools and techniques beyond the reach of critical problem solving, specifically tools and techniques of creative problem solving. In addressing level 6-7 problems, an investigator is going where nobody has gone and, in many instances, where people say one cannot go (note that we are not talking about the impossible as that itself cannot be done; rather we are talking about what others say is impossible but what really amounts to a significant level-of-pain issue). This is the realm of creative problem solving and, while the problems associated with these levels are few, they tend to be very high payoff - with attendant high risk. The bridge then for L6σ, specifically the DMEDI model, is creative problem solving and, as a consequence, the U.S. Army Materiel Command (AMC) added creative problem solving to its L6σ Program Of Instruction (POI) several years ago.

Because most (or possibly all) Level 6-7 problems require groups or Integrated Product/Process Teams, it also became clear early on that L6σ practitioners in AMC required group forming and guiding skills. The model for group development (forming-storming-norming-performing-transforming) as depicted in figure 2 is reasonably well known, but the tools and techniques for quickly getting past or through the storming and the norming phases in order to get the group into the performing phase are not.

That knowledge is not easily garnered but an understanding of group dynamics brings a wealth of application not before understood. To that end, AMC began a search to give insight into how groups interacted based on the individuals' psychological type, behavioral, and learning style preferences and quickly arrived at a point of confluence, i.e., the issue is a reflection of how individuals take in information, how they process it/solve problems, and how they make decisions. Understanding how members of an IPT do these things allows the group not to control the output of others, rather to communicate their thoughts and understand the thoughts of the other members of the group more effectively to get to the performing stage more quickly. Psychometrics are very effective in this arena, not as an earthly application of the "Vulcan Mind Meld", but as insight into the thought mechanisms of each member of the IPT. Specifically, the psychometrics AMC practitioners use in guiding groups are the Myers-Briggs Type Indicator (MBTI) and VIEW. MBTI is well known in the commercial sector but tends to be eschewed by more bureaucratic organizations, e.g., the military. While the Extrovert-Introvert and the Thinking-Feeling dichotomies may, in fact, be dismissed due to lack of statistical significance, the same cannot be said about the Sensor-Intuitor and the Judger-Perceiver dichotomies which are both statistically significant with Coefficients of Determination in excess of 0.7. Having said that, we had noted that the Thinking-Feeling dichotomy is active in groups but had not been able to establish its statistical bona fides until the advent of VIEW, roughly in 2000. VIEW brought AMC the ability to bring into group dynamics the Thinking-Feeling dimension

Model for Group Development



Adapted from: Tuckman, B. W. & Jensen, M. A. (1997). Stages of small group development revisited. *Group and Organizational Studies*, 2 419-427.

Figure 2

along with statistically significant insight into how people process information and make decisions. So, now we can articulate that AMC's deployment of L6σ includes not only the critical problem solving skills associated with L6σ, but also creative problem solving tools and techniques and group forming/guiding skills which include psychometrics that give insight into how group members take in information, solve problems, and make decisions. The use of psychometrics directly addresses the issue of effective communication and how to achieve it early on in a diverse group.

The last major piece of the AMC L6σ deployment reflects the incorporation of a Quality Management System (QMS) to ensure that the core concepts of the deployment would be held constant throughout the hierarchy of the Command (note that those concepts not held as core can be amended or changed by subordinate elements). The QMS acts as a forcing function and provides the conduit for effective communication of information critical to the elimination (or near elimination) of variance, as this is the common enemy of any L6σ deployment. Additionally, any good QMS must ensure that: the organization is: doing what it said it was going to do; doing the right thing; and constantly trying to improve its processes. In line with these concepts, AMC has selected ISO 9001:2000 as its QMS and the provision of L6σ services at the headquarters is ISO 9001 registered. The requirement to the subordinate commands is to interface with the headquarters' QMS, not to prescribe ISO 9001 as the Command-wide QMS. Essentially, as long as the plug and socket fit (and the current is the same), what QMS AMC's subordinate commands choose to impose upon themselves is up to them.

All three major components of AMC's L6σ strategy - critical problem solving, group forming/guiding and creative problem solving, and the quality management system - revolve about a central core, which espouses the theme of self-sufficiency in the shortest possible time. To that end, AMC has embedded a complete training Program Of Instruction (POI) designed to train its personnel to the Master Black Belt level in order to ensure sustainment of the L6σ gain. Just as one would not send soldiers into combat unless and until they are well trained, the L6σ practitioner must be well versed and have sufficient practice in the tools of our trade if he/she is to be successful. That POI has as its core the central process of Campaign (or Deployment) Planning. It has often been stated that a vision without an action plan is a daydream and it is this shortfall that the Campaign Plan portion of the AMC POI seeks to remedy. What the Campaign plan espouses is a detailed roadmap describing the desired output, the baselined start point, and the route from beginning to end. The plan consists of: the elucidation of processes to be investigated for design/improvement, a statement of goals described by a statement of desired product, an assess-

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Publications of interest

Preparing for the Proven Inevitable An Urban Operations Training Strategy for America's Joint Force

RAND Corporation monograph series

By: Russell W. Glenn, Jody Jacobs, Brian Nichiporuk, Christopher Paul, Barbara Raymond, Randall Steeb, Harry J. Thie

Because future military operations are likely to include actions in densely populated, built-up areas, joint and service training initiatives over the past decade have increasingly reflected an interest in preparing for such contingencies. To assist the military community in better orchestrating its resources to improve forcewide readiness for urban operations, RAND was asked to develop a joint urban training strategy for the period 2005-2011.

This report presents that strategy and describes the process used to develop it. The study identifies areas in need of redress and proposes ways in which the Services — Army, Navy, Marine Corps, and Air Force — and other critical components of national capability can better ready themselves cooperatively for future urban operations.

The strategy is developed by using a modular approach, where a module is a collection of resources normally associated with a type of facility, simulation, or other capability used in the design or execution of training. This approach led to a five-step analytical process: (1) identify joint urban training requirements; (2) identify current and pending training capabilities; (3) identify the gaps between requirements and capabilities for the short term (2005–2007) and the longer term (2008–2011); (4) define a set of modules and assess how well they address the requirements; and (5) define the steps required to create the strategy, including consideration of the costs of the modules in terms of their ability to meet requirements and address shortfalls. The strategy described here is flexible and adaptable; as such it should evolve as new technologies emerge and international conditions change. It provides guidance and suggests a framework. But most of all, it imparts a responsibility to develop programs, plans, and guidance that address the many details needed to implement.

http://www.rand.org/pubs/monographs/MG439/

Basic Research in Information Science and Technology for Air Force Needs

Committee on Directions for the AFOSR Mathematics and Space Sciences Directorate Related to Information Science and Technology, National Research Council

The U.S. Air Force is developing new force capabilities appropriate to an emerging array of threats. It is clear that advances in information science and technology (IS&T) are essential for most of these new capabilities. As a consequence, the Air Force is finding it necessary to refocus its IS&T basic research program to provide stronger support for reaching these goals. This report provides an assessment of basic research needs for Air Force systems and communications, software, information management and integration, and human interactions with IS&T systems. The report also offers a set of priorities for basic IS&T research, and an analysis of funding mechanisms.

http://fermat.nap.edu/catalog/11529.html ◆

ment of people - both those who will assist and those who will resist, and an assessment of the environment in which the deployment will be carried out. It should be noted that the AMC Deployment/Campaign Plan process follows the AMC L6σ process in that it: describes a process flow; then conducts the requisite cause and effect (C-E) analyses; is followed by the elucidation of the variables associated with the C-E analyses; establishes Standard Operating Procedures to hold designated variables constant; is followed by a Failure Modes and Effects Analysis to make the system robust to noise variables; and ends with a Design Of Experiment addressing those critical few variables that when manipulated can produce the greatest return on investment. The essence of the AMC POI and the interaction of all its components is depicted in figure 3.

In this, as in any deployment of a continuous process improvement initiative, the key ingredient is the commitment (not involvement) of Senior Management. Beyond that, however, it is fundamentally important that Senior Management understand what they are asking their people to do. AMC's L6σ deployment has attracted many of the best of the workforce and this is not unexpected. The fact is that the workforce wants to do the best job possible and is fundamentally engaged in providing the warfighter with what he/she needs to successfully prosecute our nation's battles. That being the case, Senior Management must understand their critical roles and responsibilities in ensuring the success of the deployment and the individual projects they are sponsoring which the workforce is committed to seeing through to successful conclusion. This requires hands-on involvement and a mutual commitment of the L6σ professional to the sponsor's goals and the sponsor to the successful conclusion of the L6σ professional's project. Further, it requires both to be committed to the improvement of the overall value stream of the enterprise and not just to the portion owned by the sponsor or the organization. All this requires training in the concepts (albeit not necessarily the tools and techniques) of L6σ for Senior Management and Senior Management must seek that training if the deployment is to be successful. If Senior Management accepts the challenge and actively seeks to learn their critical roles while husbanding their limited L6σ professional resources, the deployment stands a good chance of succeeding. If, however, they do not, then we must return to the second paragraph of this paper and conclude that L6σ may just be "the flavor of the month." ◆

Editor's note: Lean Six Sigma Initiative- Recommended Reading list can be found at http://www.amc.army.mil/lean/reading.htm

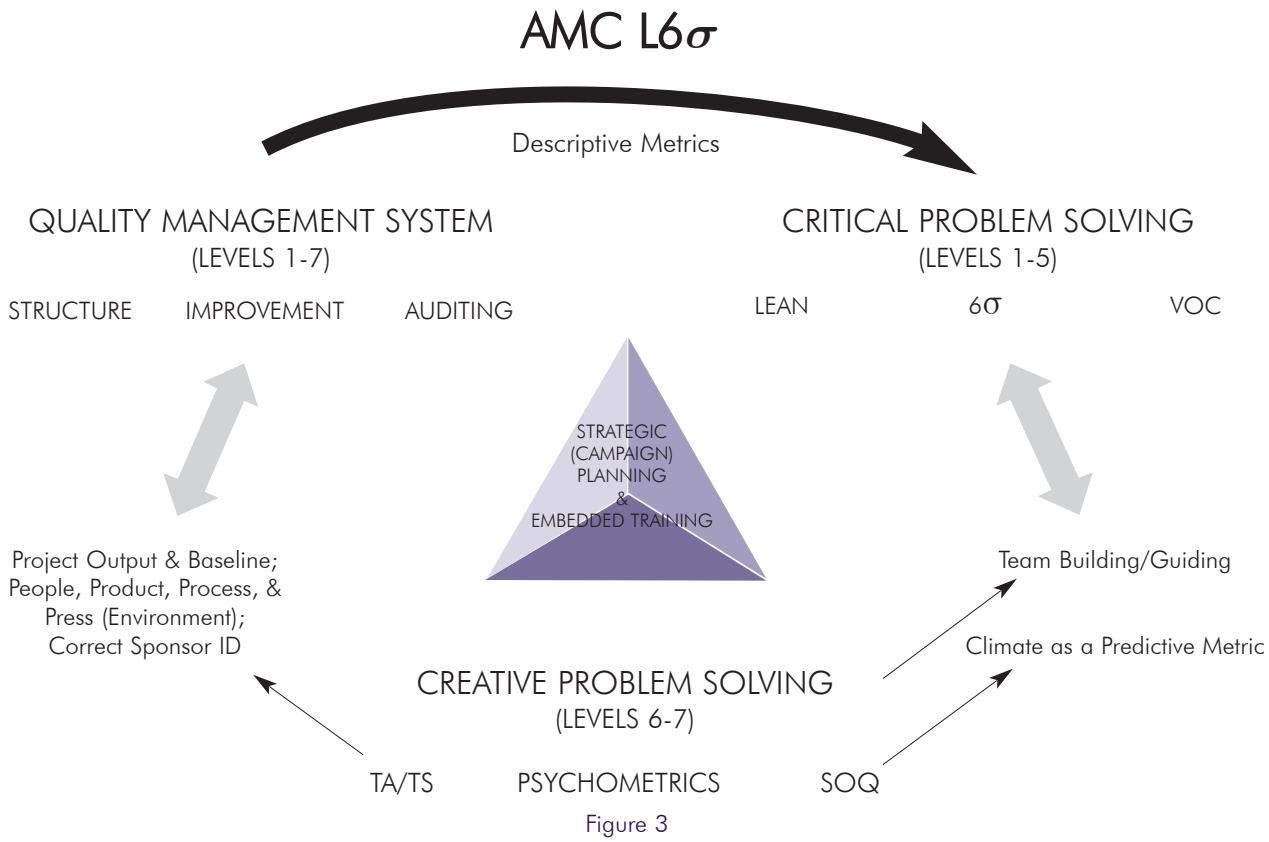

Figure 3

About the author

Mr Rod Tozzi is the HQAMC Lean Six Sigma Senior Master Black Belt at the Army Materiel Command, Industrial Operations Directorate.

Directed Energy Weapons Course

Instructor: Dr. Edward Scannell, WSTIAC

Location: Huntsville, Alabama
TBD

Course Description:
This one-day classified short course provides an introduction to the basic principles and techniques of Directed Energy Weapons (DEWs). The technologies behind each type of DEW will be examined, and the critical path components will be identified and explored with respect to their effect on future DEW development. In addition, advantages that can be achieved by employing DEWs will be discussed, as well as the status of U.S. and foreign DE developments and deployments. The key DEW programs in High Energy Lasers and RF-DEWs or High Power Microwaves will be fully described.

This short course will be of great benefit to people who need to understand the basic concepts, technologies, design requirements and practical applications of DEWs, including program and business managers, political decision makers, engineers, scientific researchers and military personnel. An undergraduate technical degree is recommended. Mathematics is kept to a minimum, but important formulas are introduced.

Questions to be examined include:

- What is Directed Energy and what are the different types of Directed Energy Weapons?
- What are the advantages and disadvantages of each type of DEW and what are their target effects and tactical and strategic capabilities?
- How do DEWs work and what are the critical technologies that must be developed for their eventual use in practical systems?
- How may threat DEW effects be countered and how can we protect our own systems?
- What are the major U.S. and international DEW programs that are being pursued?
- What is the prognosis for future DEW development?

About the Instructor:
Dr. Edward Scannell is the Senior Program Manager of the Engineering & Technical Division, Chief Scientist for WSTIAC, and formerly Chief of the Directed Energy and Power Generation Division of the U.S. Army Research Laboratory. He has 30 years of experience in technical areas related to DEWs, including: plasma physics; conventional and alternative energy sources, electromagnetic (EM) guns, particle beam, laser, high power microwave (HPM), and pulse power physics.

Security Classification:
The information presented is kept at the unclassified level, but is designated export controlled and limited to U.S. citizens only. The security classification of this course is UNCLASSIFIED.

Training at Your Location:
WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:
$700.00 for government personnel; $800.00 for government contractors.

Handout Material:
Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail
khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.

Introduction to Sensors and Seekers for Smart Munitions and Weapons Course

Instructor: Mr Paul Kisatsky, WSTIAC

Location: Huntsville, Alabama
11-13 April 2006

Course Description:

This 3-day short course provides an introduction to the most commonly used sensors and seekers employed in smart munitions and weapons (projectiles, missiles and wide area mines). It is oriented to managers, engineers, and scientists who are engaged in smart weapons program development and who desire to obtain a deeper understanding of the sensors they must deal with, but who do not need to personally design or analyze them in depth. An undergraduate technical degree is recommended. Mathematics is kept to a minimum, but important formulas are introduced. This course also provides an excellent foundation for those scientists and engineers who desire to pursue this discipline to intermediate and advanced levels.

The course covers:

- Classification of seekers and sensors
- Fundamentals of waves and propagation
- Fundamentals of noise and clutter
- Fundamentals of search footprints
- Introduction to infrared
- Introduction to radar
- Introduction to ladar
- Introduction to visionics
- Introduction to acoustics
- Future projections and interactive brainstorming

Noise and clutter, the predominant obstacles to success in autonomous seekers, are given emphasis. The major sensor types are classified and each is discussed. In particular, infrared, radar, optical laser radar (ladar), imaging and non-imaging, and acoustic sensors are individually covered. Of special interest is the discussion on human visionics versus machine recognition, since this concept is of central importance to understanding autonomous versus man-in-the-loop sensing systems. The implications of "artificial intelligence", "data fusion", and "multi-mode" sensors are also briefly discussed. System constraints, which force tradeoffs in sensor design and in ultimate performance, are also covered. Time permitting, a projection of future trends in the role of sensors for smart munitions will be presented, followed by a "brain-storming" session to solicit student views.

About the Instructor:

Mr. Paul Kisatsky is a Senior Physical Scientist. He is a nationally recognized expert on sensors and seekers for smart munitions and weapons and has more than 30 years of hands-on experience developing sensors and seekers fielded in modern smart munitions and weapons.

Security Classification:

This course is unclassified.

Training at Your Location:

WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:

The registration fee for this 3-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:

Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail
khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.

Weaponeering Course

Instructor: Professor Morris Driels, US Naval Postgraduate School

Location: Huntsville, Alabama
18-20 July 2006

Course Description:

This 2½-day short course is based on a very successful graduate-level weaponeering course developed by Professor Driels and taught at the Naval Postgraduate School(NPS), Monterey, CA. The course will provide an overview of the fundamentals of the weaponeering process and its application to air-to-surface and surface-to-surface engagements. The course explains the analytical basis of current weaponeering tools known as the Joint Munitions Effectiveness Manuals (JMEMs) produced by the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME). The JMEMs are used by all Services to plan offensive missions and allow the planners to predict the effectiveness of selected weapon systems against a variety of targets.

The short course is divided into three parts.

Part I covers the basic tools and methods used in weaponeering:

- The weaponeering process
- Elementary statistical methods
- Weapon trajectory
- Delivery accuracy of guided and unguided munitions
- Target vulnerability assessment

Part II covers the weaponeering process for air-launched weapons against ground targets:

- Single weapons directed against point and area targets
- Stick deliveries (point and area targets)
- Projectiles (guns and rockets)
- Cluster munitions
- Weaponeering for specific targets: bridges, buildings, etc.)
- Collateral damage modeling

Part III covers the weaponeering process for ground engagements:

- Indirect fire systems - artillery and mortars.
- Direct fire systems - infantry and armored vehicles.
- Mines - land and sea.

About the Instructor:

Professor Driels is a Professor of Mechanical Engineering at the U.S. Naval Postgraduate School in Monterey, California. He has worked with the JTCG/ME on a variety of topics in support of the JMEMs for a number of years. He has taught a quarter-long weaponeering course at NPS for three years and he has published a textbook on the subject.

Security Classification:

The security classification of this course is UNCLASSIFIED.

Training at Your Location:

WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:

The registration fee for this 2½-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:

Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail
khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.

Smart/Precision Weapons Course

Instructors: Mr. Hunter Chockley and Mr. Mark Scott, WSTIAC

Location: Huntsville, Alabama

18-20 April 2006
11-13 July 2006

Course Description:

This 2½-day short course provides a comprehensive understanding of smart weapons and related technologies. This course is aimed at providing general knowledge about smart weapons technology and a source of current information on selected U.S. and foreign smart weapons, to include system description, concept of employment, performance characteristics, effectiveness and program status.

A variety of ground, sea and air smart/precision weapon systems are discussed, to include fielded and/or developmental U.S. systems such as Joint Direct Attack Munition (JDAM), Joint Air-to-Surface Standoff Missile (JASSM), Small Diameter Bomb, Javelin, Line-of-Sight Anti-Tank (LOSAT), XM982 Excaliber, Extended Range Guided Munition (ERGM), Common Missile, Tomahawk, Standoff Land Attack Missile - Expanded Response (SLAM-ER), Cluster Bomb Munitions and Airborne Laser, among others, as well as representative foreign smart/precision weapons.

The objective of this course is to inform materiel and combat developers, systems analysts, scientists, engineers, managers and business developers about smart/precision weapons, to include:

- State-of-the-art of representative U.S. and foreign smart weapons systems;
- Employment concepts
- Smart weapons related systems, subsystems, and technologies; and
- Technology trends.

About the Instructors:

Mr. Mark Scott and Mr. Hunter Chockley are Science Advisors. Each instructor has more than 25 years of experience with weapons technology and/or smart/precision weapons.

Security Classification:

The information presented is kept at the unclassified level, but is designated FOR OFFICIAL USE ONLY (FOUO), export controlled, and attendance is limited to U.S. citizens. The security classification of this course is UNCLASSIFIED.

Training at Your Location:

WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:

The registration fee for this 2½-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:

Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail
khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.

Calendar of Events

Upcoming Conferences and Courses

May 2006

9-11 May 2006
51st Joint Electronic Warfare Conference
Las Vegas, Nevada
http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1392

9-11 May 2006
Fuze Conference
Norfolk, VA
http://www.ndia.org/Template.cfm?Section=6560&Template=/ContentManagement/ContentDisplay.cfm&ContentID=11178

15-18 May 2006
Joint Services Small Arms Systems Symposium, Exhibition & Firing Demonstration
Albuquerque, NM
http://www.ndia.org/Template.cfm?Section=6610&Template=/ContentManagement/ContentDisplay.cfm&ContentID=10748

15-19 May 2006
2006 IEEE International Conference on Robotics and Automation (ICRA)
Orlando, FL
http://www.icra2006.org/

22-25 May 2006
33rd Annual Electronic Warfare Symposium
NAS Whidbey Island, WA
http://www.whidbeyroost.org/pageshtm/ewsym.htm

23-24 May 2006
Spectrum Management for Defense,
Arlington, VA
http://www.idga.org/cgi-bin/templates/singlecell.html?topic=221&event=9644

23-24 May 2006
Ground Combat Vehicles
Survivability In Hostile Terrain
Washington, DC
http://www.idga.org/cgi-bin/templates/singlecell.html?topic=221&event=9737

31 May-1 June 2006
14th Annual Expeditionary Warfare Division Wargame
Quantico, VA
http://www.ndia.org/Template.cfm?Section=6850&Template=/ContentManagement/ContentDisplay.cfm&ContentID=11339

June 2006

7-8 June 2006
2006 IEEE Conference on Technologies for Homeland Security
Cambridge, MA
http://www.ieeeboston.org/homeland2006.htm

7-9 June 2006
Lean Six Sigma for Defense
Arlington, VA
http://www.idga.org/cgi-bin/templates/singlecell.html?topic=241&event=9856

11-16 June 2006
2006 IEEE/MTT-S International Microwave Symposium
San Francisco, CA
http://www.ims2006.org

12-14 June 2006
Armaments Technology Seminar & Exhibition
Parsipanny, NJ
http://www.ndia.org/Template.cfm?Section=6600&Template=/ContentManagement/ContentDisplay.cfm&ContentID=12258

12-14 June 2006
IED 2006 Symposium & Expo-Breaking the Chain
Fayetteville, NC
http://www.defensetradeshows.com/IED_General_Info.html

13-15 June 2006
6th Annual Intelligent Vehicle Systems Symposium & Exhibition
Traverse City, MI
http://www.ndia.org/Template.cfm?Section=C504&Template=/ContentManagement/ContentDisplay.cfm&ContentID=10976

19-20 June 2006
TechNet International 2006
Washington, DC
http://www.afcea.org/calendar/eventdet.jsp?event_id=11641&w=Y

26-29 June 2006
4th International Energy Conversion Engineering Conference and Exhibit (IECEC)
San Diego, California
http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1309

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